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nical matter could be found in Oregon. Accordingly the author learned to set type, and for nearly eight years has "set up" form after form until the 800 pages and more have been printed. We venture the assertion that no manual of botany, and probably no botanical work, has ever been issued at such a cost of labor to the author.

The value of the book is just what the experience of the author has made it, and no one knows so well the plants of the region covered. In addition to this, Mr. Howell is to be congratulated upon his indomitable pluck, in the presence of which a few typographical errors here and there and a little lack of typographical finish must be entirely forgotten.—J. M. C.

A study in heredity.

A STUDY in heredity by W. Johannsen⁷ reaches the conclusion that Galton's law of regression is true in populations made up of several pure lines, but is not true in the pure lines taken singly. By a pure line is meant a group of individuals which have descended from a single self-fertilized individual. The author shows that a monomodal curve is not sufficient evidence that a population is homogeneous, but that a process of biological analysis must precede the general mathematical analysis, to attain satisfactory results. When Galton's law is found to hold in self-fertilizing populations it is interpreted as the result of incomplete isolation of the pure lines, and when the isolation is complete, *i. e.*, in a single pure line, there is complete regression of the mean characters of the offspring to the type of that line. This absolute fixity of type is too unique to be accepted without question, but if sustained by further research is a sufficiently important principle in questions of evolution in those special cases in which pure lines are involved; as in cleistogamous and other self-fertilizing populations, and in populations arising through parthenogenetic and vegetative reproduction. But exception may be taken to the author's view that the principle is fundamental to all study of heredity.

The results are based upon weight and form of seeds of *Phaseolus vulgaris* and on certain abnormalities in heads of rye. Only three generations are involved, and no account is taken of the influence of climatic fluctuations.—G. H. SHULL.

MINOR NOTICES.

THE VERMONT Agricultural Experiment Station has issued a bulletin dealing with the flow of maple sap.⁸ The bulletin sets forth an enormous amount of experimental work, a large portion of which is directed to the physiological problems of sap pressure and sap flow. The effects of external

⁷ JOHANNSEN, W., Ueber Erblichkeit in Populationen und in reinen Linien. pp. 68. *figs. 8*. Jena: Gustav Fischer. 1903.

⁸ JONES, C. G., EDSON, A. W., and MORSE, W. J., The maple sap flow. Bull. 103, Vermont Agric. Expr. Sta. pp. 43-184. *figs. 6. pls. 17*. 1903.